

Keeping Score

Life cycle assessment is a critical tool that examines all aspects of a product's life, from cradle to grave.

by Joseph Hittinger, IIDA, Assoc. AIA

Have you ever specified a material you thought to be “green” only to find out later that instead of helping the environment you may be hurting it? While working on a recent project, we considered specifying a product with a recycled content only to discover that the process by which the material is recycled requires more than double the energy required for virgin materials. Also, once the life of this product was over, it did not have the ability to be recycled again.

Instead it would end up in a landfill.

This story exemplifies the need for Life Cycle

Assessment. LCA is a tool designers and specifiers can use to look at all aspects of a

product's life, from cradle to grave. LCA provides key science-based information often lacking in the product selection decision. If a designer specifies a material based on a single impact, it can obscure other impacts that may cause even greater damage.

A number of different LCA tools are available today: Athena, TEAM, BEES, BaseLineGreen, Gabi and Simapro. TEAM, GaBi and Simapro are all commercial life cycle assessment databases and are not restricted to building products. They must be purchased (along with annual data updates) and are intended for the informed life cycle practitioner. All

three are used to develop life cycle datasets for products based on the user's knowledge of the manufacturing processes that go into the production of each product. With these commercial databases the user has much more control over the data and its underlying assumptions. Commercial databases are extremely well documented, listing the source and data quality of every data item.

By contrast the life cycle data in BEES are fixed. The way the BEES data are generated is that the

TEAM developers, Ecobalance, work with manufacturers to establish reasonable assumptions about the manufacture of their products, then use TEAM to generate

BEES data based on these assumptions. To preserve manufacturer trade secrets, the BEES data are necessarily aggregated and are documented in less detail than are the commercial databases.

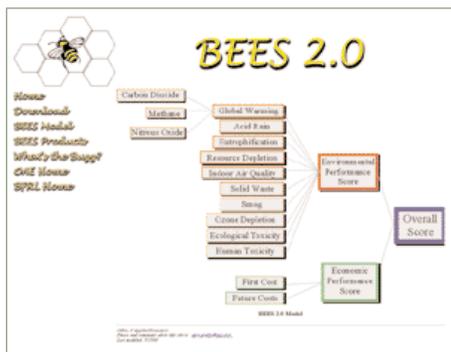
What does this mean? BEES is a free, user-friendly adaptation of the commercial databases for those in the building community who are not necessarily familiar with life cycle assessment. BEES also analyzes the data to arrive at single environmental performance scores, and adds an economic performance dimension not found in the commercial databases.

We spoke with Bobbie Lippiatt of the

National Institute of Standards & Technology (NIST) to further explore the BEES Program. BEES (Building for Environmental and Economic Sustainability) measures the environmental performance of building products using the LCA approach specified in ISO 14040 standards. BEES focuses on 10 impact areas: global warming, acidification, natural resource depletion, indoor air quality, solid waste, smog, ozone depletion, ecological toxicity, human toxicity and eutrophication (the unwanted addition of minerals/nutrients to soil and water). These 10 impact areas are analyzed throughout all stages of a product's life: raw material acquisition, manufacture, transportation, installation, use and waste management.

Economic performance is measured by using the American Society for Testing and Materials (ASTM) life cycle cost method (E 917) which covers the costs of initial investment, replacement, operation, maintenance, repair and disposal. Designers can compare one product to another through a series of graphs, charts and summary tables. It is sometimes an unsettling experience, as light is shed on assumptions made about a product. We have been surprised on more than one occasion by a product's environmental impact.

Currently BEES analyzes 65 product categories. These categories are general and have established an industry average. For example, there is information regarding nylon carpet, wool carpet and recycled



polyester carpet, however one cannot research a proprietary specification. That is, not yet. NIST has begun a new version called BEES PLEASE which will include brand specific coverage in addition to the industry averages that currently exist. The industry seems to be excited and NIST has already received 3,500 inquiries to getting specific products listed. If you are interested in providing your company's data to BEES PLEASE, contact Bobbie Lippiatt at blippiatt@nist.org. If you would like to download a copy of the BEES program you may do so at www.bfpl.nist.gov/oe/bees.html.

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Knowing the Terms

In any discussion about life cycle assessment, it is helpful to understand the meaning of terms being used. For example, there are a number of carpet recycling and reclamation efforts by various companies—but what differentiates one from the other? It is important to clarify and identify the different types of carpet recycling, so you can select a carpet that provides the most environmental benefits without sacrificing any performance requirements.

In recycling, numerous terms are used, each have different meanings. While there are no official definitions for each term, here are common uses:

- **Carpet recycling**
Often used as a generic term encompassing all types of recycling and reclamation of various carpet parts including fibers and backing.
- **Carpet reclamation**
Typically refers to cleaning and repairing of carpet for reinstallation. The carpet is not reprocessed or remanufactured in any way, rather it is cleaned and repaired using heavy-duty, commercial techniques.
- **Downcycling**
A form of recycling where carpet fibers are separated and re-melted for use in low value, non-critical, non-aesthetic plastics applications. This is the standard practice for recycling carpet fibers of nylon type 6,6. Eventually, the nylon quality is degraded to the point where it can no longer be recycled and is disposed. PET soda bottle recycling into carpet fibers also is a form of downcycling since the resulting fibers are disposed at the end of the carpet life.
- **Closed-loop recycling**
The form of recycling where carpet fibers are chemically renewed in a depolymerization process and manufactured into first-quality carpet fibers again. A true closed-loop process allows sustainable renewal of fibers over and over again without loss of any properties and without ever being landfilled. This allows maximum value recovery of the original materials.

—Information supplied by Honeywell Inc.



Residential and commercial carpets made with Infinity™ Forever Renewable Nylon from Honeywell are examples of carpet that are both recycled and recyclable in a true closed-loop process.